

AGRICULTURAL STRUCTURAL SYSTEMS I

Curriculum Content Framework

Prepared By

Bob Barnes, Morrilton
Bob Collard, Nemo Vista
Jim Cunningham, Newark
Darren Hawkins, Beebe
Charlie Johnson, Highland
Mike Rogers, Siloam Springs

Facilitated By

Karen Chisholm, Program Manager
Office of Assessment and Curriculum
Arkansas Department of Workforce Education

Edited By

Angela Collins, Program Advisor
Office of Agricultural Science and Technology
Arkansas Department of Workforce Education

Disseminated By

Career and Technical Education
Office of Assessment and Curriculum
Arkansas Department of Workforce Education

Curriculum Content Framework

AGRICULTURAL STRUCTURAL SYSTEMS I

Grade Levels: 10, 11, 12
Course Code: 491160

Prerequisites: Agriculture Science and Technology; Agriculture Mechanics I; Agriculture Mechanics II

Course Description: Students will be introduced to basic practices used in farm building and construction of facilities for the farm. Topics include FFA, SAE, planning, tools, basic construction, surveying, and safety practices.

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Unit 1: Introduction to Agricultural Structures

9 hours

Terminology: Architect, Barn, Career Development Event, Electrician, Equipment shed, General contractor, Milking parlor, Plumber, Proficiency award, Record book, Repair shop, SAE, Sub-contractor

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
1.1 Define terms related to agricultural structures		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
1.2 Describe FFA activities and programs of interest to students interested in agricultural structures		Foundation	Speaking	Asks questions to obtain information [1.5.4]
		Personal Management	Integrity/Honesty/Work Ethic	Describes/Explains significance of integrity, honesty, and work ethics [3.2.4]
1.3 Describe SAE activities and programs of interest to students interested in agricultural structures	1.3.1 Keep an accurate SAE record book	Foundation	Speaking	Asks questions to obtain information [1.5.4]
1.4 Discuss careers that involve skills necessary for agricultural structures	1.4.1 Research a career in agricultural structures to determine educational requirements, working conditions, and salary.	Foundation	Listening	Evaluates oral information/presentation [1.2.2]
		Personal Management	Career Awareness, Development, and Mobility	Explores career opportunities [3.1.6]
1.5 Identify skills needed in designing, building, and maintaining agricultural structures		Foundation	Math	Computes using a formula [1.1.14] Interprets mathematical symbols [1.1.26]
		Thinking	Knowing how to Learn	Applies new knowledge and skills to agricultural structures [4.3.1]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
1.6 List types of structures used in various areas of agriculture	1.6.1 Visit local agricultural businesses and farms to observe different types of structural systems	Foundation Thinking	Reading Creative Thinking	Follows written directions [1.3.13] Combines ideas or information in new ways [4.1.2]

Unit 2: Safety Considerations in Agriculture Structures

18 Hours

Terminology: Class A fire, Class B fire, Class C fire, Class D fire, Fatigue, Fire triangle, Safety colors, Safety goggles, Safety harness, Safety zone

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
2.1 Define terms related to safety in agricultural structures		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
2.2 Identify the frequent causes of accidents in agricultural structures		Foundation	Listening	Comprehends ideas and concepts related to safety [1.2.1]
		Thinking	Creative Thinking	Makes connections between seemingly unrelated ideas [4.1.6]
2.3 List precautions that may be taken to prevent accidents in agricultural construction	2.3.1 Develop a safety plan for your school's agricultural mechanics lab	Foundation	Listening	Receives and interprets verbal messages [1.2.8]
		Thinking	Decision Making	Considers risks when making a decision [4.2.3]
2.4 Identify safety colors associated with the shop		Foundation	Listening	Receives and interprets verbal messages [1.2.8]
		Thinking	Knowing how to Learn	Processes new information as related to workplace [4.3.5]
2.5 Explain how fires and fire extinguishers are classified	2.5.1 Illustrate the proper use of a fire extinguisher	Foundation	Science	Applies life-saving techniques [1.4.4]
		Thinking	Knowing how to Learn	Applies new knowledge and skills to agricultural structures [4.3.1]

Unit 3: Planning Agriculture Structures

18 Hours

Terminology: Architect's scale, Bill of materials, Building site, CAD program, Drainage, Drawing triangle, Measuring tape, Plot plan, Prevailing wind direction, Sketching, Square footage, T-square

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
3.1 Define terms related to planning agricultural structures		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
3.2 Locate specific measurements on a rule		Foundation	Math	Makes precision measurements using a rule [1.1.27]
3.3 List factors to consider in selecting sites for agricultural structures	3.3.1 Interview a soil conservationist to talk to the class about selecting sites for agricultural structures	Foundation	Listening	Evaluates oral information/presentation [1.2.2]
		Thinking	Problem Solving	Revises plan of action indicated by findings [4.4.9]
			Seeing Things in the Mind's Eye	Organizes and processes images –symbols, pictures, graphs, objects, etc. [4.6.2]
3.4 Explain how space requirements are determined	3.4.1 Study a table showing the approximate space requirements for different pieces of farm machinery	Foundation	Math	Constructs graphs/charts/tables [1.1.16]
		Thinking	Problem Solving	Revises plan of action indicated by findings [4.4.9]
			Reasoning	Uses logic to draw conclusions from available information [4.5.6]
3.5 Identify symbols used in construction plans		Foundation	Math	Uses basic geometric symbols, terms, principles, and formulas [1.1.34]
		Thinking	Reasoning	Applies rules and principles to a new situation [4.5.1]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
			Problem Solving	Recognizes/Defines problem [4.4.8]
3.6 Explain the uses of common drawing tools		Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2] Communicates a thought, idea, or fact in spoken form [1.5.5]]
3.7 Describe the use of CAD programs		Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2] Communicates a thought, idea, or fact in spoken form [1.5.5]]
3.8 Discuss the importance of scale in construction plans	3.8.1 Create a three-view drawing of an agricultural structure, using appropriate symbols and scale	Foundation	Math	Uses common measuring devices/tools to measure drawing plans [1.1.37]
		Interpersonal	Teamwork	Comprehends ideas and concepts related to agricultural structures [2.6.1]
		Personal Management	Career Awareness, Development, and Mobility	Analyzes own knowledge, skills, and ability [3.1.2]
3.9 Explain how a bill of materials is figured	3.9.1 Figure a bill of materials for the structure drawn	Foundation	Math	Applies a mathematical formula to solve a problem [1.1.3]
		Interpersonal	Coaching	Helps others learn new skills [2.1.3]
		Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]

Unit 4: Tools Used in Agricultural Structures

18 Hours

Terminology: Carpenter's level, Carpenter's square, Circular saw, Combination square, Cordless drill, Nail gun, Reciprocating saw, Scaffold, T-bevel square, Wrecking bar

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
4.1 Define terms related to tools used in agricultural structures		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
4.2 Discuss safety considerations of tools used in agricultural construction		Personal Management	Career Awareness, Development, and Mobility	Establishes and implements a plan of action [3.1.5]
4.3 Identify hand tools used in agricultural structures construction	4.3.1 Demonstrate the correct use of the following classes of hand tools: layout tools, cutting tools, boring tools, driving tools, holding tools, turning tools, digging tools	Foundation	Listening	Receives and interprets verbal messages [1.2.8]
			Reading	Reads and follows instructions to operate technical equipment [1.3.19]
4.4 Identify portable power tools used in agricultural structures construction	4.4.1 Demonstrate the correct use of the following portable power tools: drill, belt sander, disc sander, grinder, finishing sander, saber saw, reciprocating saw, circular saw	Foundation	Reading	Reads and follows instructions to operate technical equipment [1.3.19]
		Personal Management	Organizational Effectiveness	Applies knowledge to implement work-related system or practice [3.3.4]
		Thinking	Decision Making	Generates options/alternatives [4.2.6]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
4.5 Identify stationary power tools used in agricultural structures	4.5.1 Demonstrate the correct use of the following stationary power tools: band saw, jig saw, table saw, radial arm saw, planer, sander	Foundation	Science	Uses equipment and techniques [1.4.23]
		Interpersonal	Leadership	Organizes group in planning and performing a specific task [2.4.9]
		Thinking	Problem Solving	Draws conclusions from what is read, and gives possible solutions [4.4.4]

Unit 5: Basic Construction

22 Hours

Terminology: Anchor bolts, Ceiling joist, Floor joist, Rise, Roof pitch, Run, Span, Stud wall, Top plate

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
5.1 Define terms related to basic agricultural construction		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
5.2 Explain the functions of the parts of a typical agricultural structure		Foundation	Listening	Receives and interprets verbal messages [1.2.8]
		Thinking	Knowing how to Learn	Applies new knowledge and skills to basic carpentry [4.3.1]
			Seeing Things in the Mind's Eye	Organizes and processes images—symbols, pictures, graphs, objects, etc. [4.6.2]
5.3 Discuss considerations in selecting building materials	5.3.1 Visit a building-supply store to compare different building materials	Foundation	Speaking	Asks questions to obtain information [1.5.4]
		Interpersonal	Coaching	Comprehends ideas and concepts related to basic carpentry [2.1.1]
5.4 Compare post-frame, wood-frame, metal-frame, concrete/masonry, and pole buildings		Foundation	Reading	Evaluates written information for accuracy, appropriateness, and style [1.3.14]
		Thinking	Creative Thinking	Combines ideas or information in new way [4.1.2]
		Personal	Responsibility	Pays close attention to details [3.4.8]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
5.5 List factors to consider in selecting a roof style	5.5.1 Label various styles of roofs	Foundation Thinking	Listening Creative Thinking	Listens for content [1.2.3] Makes connections between seemingly unrelated ideas [4.1.6]
5.6 Compare roofing materials for durability and cost		Foundation Interpersonal Personal Management	Listening Cultural Diversity Responsibility	Comprehends ideas and concepts related to roofing materials [1.2.1] Comprehends ideas and concepts related to basic carpentry [2.2.1] Pays close attention to details [3.4.8]

Unit 6: Surveying 5 Hours

Terminology: Backsight, Elevation, Foresight, Legal description, Metes and bounds, Plumb bob, Section, Township, Transit, Tripod

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
6.1 Define terms related to surveying		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
6.2 Calculate distance		Foundation	Math	Calculates measurements taken from measuring devices [1.1.9]
6.3 Read legal descriptions		Foundation	Reading	Draws conclusions from what is read [1.3.12] Identifies relevant details, facts, and specifications [1.3.16]
6.4 Determine elevation using differential leveling	6.4.1 Identify tripod, transit, plumb bob, & rod	Foundation	Math	Operates technical equipment to reach mathematical conclusions [1.1.30]
6.5 Record field notes		Foundation	Writing	Writes appropriate entries [1.6.22] Writes/Prints legibly [1.6.24] Adapts notes to a proper form [1.6.1]

Glossary

Unit 1: Introduction to Agricultural Structures

1. Architect—an occupation responsible for designing and drawing plans for buildings
2. Barn—a building where animals are housed and/or hay and feed are stored
3. Career Development Event—a contest in which FFA members compete against each other to demonstrate their skills in areas such as electrification, ag. mechanics, etc.
4. Electrician—an occupation responsible for installing lighting fixtures, receptacles, wiring, etc.
5. Equipment shed—a building in which machinery is stored
6. General contractor—the person responsible for overseeing all of the steps necessary to build a building
7. Milking parlor—a building in which dairy cattle are brought to be milked and milk is stored
8. Plumber—an occupation responsible for installing water lines and drainage as well as other plumbing fixtures
9. Proficiency award—a program that allows FFA members to win honors for success in conducting their SAE
10. Record book—a printed booklet in which ag. students can record hours, earnings, expenditures, and other information related to their SAE
11. Repair shop—a building where equipment is brought to be repaired
12. SAE—a program that requires all ag. ed. students to have a work experience project conducted outside of school
13. Sub-contractor—a person such as a plumber or electrician who performs one part of the entire construction project

Unit 2: Safety Considerations in Agricultural Structures

1. Class A fire—a fire fueled by solids such as paper or wood
2. Class B fire—a fire fueled by flammable liquids such as gasoline or paint thinner
3. Class C fire—a fire fueled by electricity
4. Class D fire—a fire fueled by flammable metals such as magnesium
5. Fatigue—a condition that causes many accidents on farms due to working long hours
6. Fire triangle—represents the three essential components of a fire (if one side is removed, the fire will go out)
7. Safety colors—a system developed by OSHA that uses colors to indicate danger zones, safety equipment, etc.
8. Safety goggles—equipment used to protect the eyes from flying objects and particles
9. Safety harness—equipment used to prevent workers from being injured from falls when working in high places
10. Safety zone—the area around a piece of machinery inside which a person is in some degree of danger (no one should be inside this zone except the operator)

Unit 3: Planning Agricultural Structures

1. Architect's scale—an instrument used for measuring when drawing building plans that converts measurements to different scales
2. Bill of materials—a list of all the building materials needed to complete a building project
3. Building site—the location in which the construction of a structure will take place
4. CAD program—a computer program that allows architects and engineers to draw plans on a computer
5. Drainage—the natural removal of water from the building site
6. Drawing triangle—drawing tools that are used with a T-square to draw 30-, 45-, or 60-degree angles or can be used in combination to draw other angles
7. Measuring tape—a retractable rule used by construction workers to measure various components when building
8. Plot plan—a general plan of the building site with legal descriptions and perimeter dimensions
9. Prevailing wind direction—the direction from which the wind normally blows
10. Sketching—drawing scaled plans for buildings
11. Square footage—the area size of a building expressed by width times length
12. T-square—a drafting tool that is used with a drawing board, architect's scale, and triangles to draw horizontal and vertical lines in a plan

Unit 4: Tools Used in Agricultural Structures

1. Carpenter's level—a tool used by construction workers to check level on horizontal components and plumb on vertical components
2. Carpenter's square—an L-shaped tool with a 16" tongue and a 24" blade that is used to layout rafter angles and to check that frames are at a 90-degree angle
3. Circular saw—any saw that has a round blade used in carpentry, including a table saw, radial saw, miter saw, and skillsaw (slang term)
4. Combination square—a layout tool that has a 12" blade and a sliding head with both 45- and 90-degree angles and can be used for a marking gauge
5. Cordless drill—a battery-powered tool that is used to drill holes and drive screws
6. Nail gun—a pneumatic or electric tool that is used to drive nails rapidly
7. Reciprocating saw—a saw developed by the Milwaukee Tool Co. (slang name is "Sawzall") that is used mainly in demolition of buildings
8. Scaffold—a set of frames that is used for workers to stand on when working at high elevations
9. T-bevel square—a type of square that has a blade that can be adjusted and is used to transfer angles
10. Wrecking bar—a demolition tool with a crook on one end for pulling nails and a wedge on the other end for prying

Unit 5: Basic Construction

1. Anchor bolts—bolts that are used to fasten the frame of the building to the foundation
2. Ceiling joist—a horizontal framing component that spans the building, is supported by the stud walls, and holds the ceiling material
3. Floor joist—a horizontal framing component that spans the building, is supported by the foundation and piers, and supports the subfloor
4. Rise—the vertical distance from the ridge down to the top plate or the bottom of the ceiling joists
5. Roof pitch—the angle of the roof of a building; calculated as rise over run and expressed in ratios such as 4:12 or 6:12
6. Run—the distance from the center of the building to the outside wall (half the span)
7. Span—the width of the building
8. Stud wall—the vertical framing component that is usually built from 2" x 4" or 2" x 6" lumber and supports the trusses and has siding attached
9. Top plate—the uppermost horizontal component on a stud wall that supports the ceiling joists

Unit 6: Surveying

1. Backsight—reading taken from a known elevation
2. Elevation—the height of something above a reference point
3. Foresight—reading taken on a new point to determine its elevation
4. Legal description—documentation that tells the exact boundaries of a piece of property (e.g., The SW1/4 of the NE1/4 Sec. 21 T-16N R-5W Containing 40 Acres M/L)
5. Metes and bounds—a method of land description in which the dimensions of the property are measured by distance and direction beginning from a definite starting point that can be located by future surveyors
6. Plumb bob—a cone shaped instrument suspended from a string that is used to locate a point directly beneath the point from which it is suspended
7. Section—a tract of land that is one of 36 in a township, is approximately 1 mile X 1 mile and contains 640 acres (more or less)
8. Township—a block of land that is located by its tier and range, is 6 miles X 6 miles, and contains 36 sections
9. Transit—a surveyor's instrument used by builders to establish points and elevations both vertically and horizontally; it can be used to line up stakes, plumb walls, or measure the angle of elevation from a horizontal plane
10. Tripod—a three-legged frame that is used to support a transit when surveying